

Spatiotemporal dynamics of forage and water resources shape space use of West African savannah buffalo

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Abstract: We investigated space-use patterns of the West African savanna buffalo (*Syncerus caffer brachyceros*), a little-studied subspecies occurring at the northern limit of the African buffalo's geographical range. This buffalo generally ranges in small herds (about 45 individuals) and has a low body mass (approximately 400 kg) relative to the Cape buffalo (*S.c. caffer*). We monitored the movements of 7 breeding herds in "W" Regional Park (Burkina Faso, Benin and Niger) using GPS collars and activity data loggers. Habitat selection was analyzed at both large (inter-seasonal) and small (intra-seasonal) scales in a context where resources are segregated spatially at some times of year. Both biotic (primary production, vegetation types) and abiotic (timing of rainfall, surface water) covariates, and the extent to which neighbouring herds shared space, were considered. In the dry season buffalo herds ranged close (within 5.3 ± 2.0 km, Mean \pm SD) to segments of permanent rivers. At the onset of the monsoon all herds but 1 (which had year-round access to suitable resources) performed a large (35 ± 10 km) directional movement in response to a large-scale gradient of primary production. Spatiotemporal dynamics of forage and water resources thus jointly stimulated inter-seasonal directional movements and shaped large (335 ± 167 km²) annual home ranges. Furthermore, the establishment of home ranges in the wet season appears to be conditioned by a threshold (about 10%) in the availability of perennial grasses. Habitat selection analysis at intra-seasonal scale also underlined the key role played by perennial grasses for buffaloes. The spatial arrangements of home ranges of neighbouring herds also suggest that inter-herd behavioural avoidance is a high-level constraint on foraging processes. The ability of the African buffalo to cope with contrasting environmental conditions throughout most sub-Saharan ecosystems highlights the high behavioural plasticity of this species.

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